MOA Number: FNA/02-03-01 Effective Date: December 12, 2003

MEMORANDUM OF AGREEMENT
between the
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
and
FEDERAL AVIATION ADMINISTRATION
concerning

AERONAUTICAL SAFETY AND HUMAN FACTORS

I. PURPOSE

This Memorandum of Agreement (MOA) establishes a strategic partnership between the FAA Office of Aviation Research and the NASA Aeronautics Technology Division with respect to the conduct of human factors research in commercial air transportation, general aviation, vertical flight, aviation maintenance, flight technologies and procedures, air traffic control/airway facilities, and bioaeronautics. This MOA includes collaboration between the FAA and NASA to augment FAA capabilities and expertise with NASA-provided research.

II. BACKGOUND AND RATIONALE

Human factors related aviation incidents and accidents remain subjects of great public concern. Despite the aerospace industry's success at developing ever more sophisticated and reliable technology, the proportion of human error-related incidents and accidents remains remarkably constant. This fact, combined with the requirement to increase productivity, resulted in considerable attention to human factors research and application programs over the last several years. Valuable programs in aviation human factors have been underway for many years at the FAA, NASA, and Department of Defense (DOD), as well as in academic and industry sectors. However, sufficient coordination, adequate funding, or long-term, high level management support in most government and industry organizations did not exist. Under the sponsorship of the FAA, NASA, and the DOD (all as signatories), the *National Plan for Civil Aviation Human Factors: An Initiative for Research and Application*, published in March 1995, outlines a coherent national agenda of research plans, programs and processes employed by each participating organization with a focus on the following five research thrusts:

Human-Centered Automation - Research in this area addresses the identification and application of knowledge concerning the relative strengths and limitations of humans in an automated environment. It investigates the implications of computer-based technology in the design, evaluation and certification of controls, displays and advanced systems. Human-Centered Automation research investigates the role of the operator (active or passive) and the

cognitive and behavioral effects of using automation to assist humans in accomplishing their assigned tasks with increased safety and efficiency.

Selection and Training - National Air Space (NAS) efficiency and effectiveness is enhanced through research to: (1) understand the relationship between human abilities and aviation task performance; (2) enhance the measures and methods for the prediction of future job/task performance; (3) develop a scientific basis for the design of training programs, devices, and aids; (4) define criteria for assessing future training requirements; (5) and to identify new ways by which to select aviation system personnel. The recipients of research findings on selection and training are flight crews, air traffic controllers, Airways Facilities systems management personnel, aviation maintenance technicians, airport security personnel, and others in the aviation community who contribute to safety and efficiency.

Human Performance Assessment - Research under this thrust targets measurement and improved understanding of human performance capabilities and limitations in aviation. Cognitive and interpersonal skills of individuals, characteristics of teams, and organizational factors directly shape the safety and efficiency of aviation operations. This research will provide ways to improve safety and productivity through better equipment design, training, and system performance.

Information Management and Display - Research conducted under this thrust seeks improved safety and performance by addressing the presentation and transfer of information among components in the NAS, including controller workstations, the flight deck, Airway Facilities, and all the interfaces which link these functions together.

Bioaeronautics – Emphasis in this thrust will be on the biometrics, bioengineering, biomedicine, and biochemistry associated with performance and safety. Research will focus on enhancing personal performance and safety by maximizing crew and passenger health and physiological integrity. Also addressed will be safety equipment and procedure design, cabin egress, rescue, and in-flight medical care.

Both the FAA and NASA have similar goals in relation to aeronautical safety and system efficiency: reduce aviation fatal accident rates and provide an aerospace transportation system that meets the needs of users and is efficient in the application of aerospace resources. This MOA is consistent with the intent of the FAA/NASA Partnership Agreement (10/9/98) and the Human Factors Memorandum of Understanding (MOU) (FNA 02 (8/14/02)) and consolidates the following MOAs: FNA/ 01-93-02, FNA/01-94-01, FNA/02-93-01, and FNA/ 02-93-02. Additionally, it supports the purpose of the *National Plan* and the FAA and NASA goals for safety and efficiency.

III. OBJECTIVE/SCOPE

The objective of this MOA is to establish an expanded working relationship between the FAA and NASA, and to provide a mechanism for the most effective use of limited resources in

advancing human factors research. This research will address the five research thrusts outlined in the *National Plan* by:

- Guiding incorporation and expansion of human factors considerations in aircrew training
- Supporting development of human-centered flight controls and displays
- Exploring prospects for safety enhancement through application of human factors in certification of new aircraft equipment design and modification
- Developing more effective methods for maintenance technician and inspector training and task performance, evaluating the effects of enhancing maintenance resource maintenance, and identifying strategies to mitigate errors
- Helping to understand human causal factors associated with accidents, developing enhanced vision systems, and improving pilot decision-making and performance
- Using research findings and recommendations from assessments of human performance to help guide development of human-centered automation and procedures that will enhance pilot, controller and maintainer decision-making
- Guiding development of tools and procedures to support collaborative decision-making required for the future National Aerospace System
- Enabling the FAA and NASA to exploit new and evaluate existing bioaeronautical guidelines, standards, and models for aircraft cabin equipment, procedures and environments, and to improve the health and safety of aircraft crew and passengers
- Conducting research to understand the critical human performance considerations impacting desired safety and efficiency outcomes for integrated air/ground operations in advanced CNS/ATM NAS.

When appropriate, specific plans will be prepared in accordance with Section IV below to provide for authorization and transfer of funds between agencies, and to use FAA and NASA research and operational facilities. This MOA does not limit the use of other resources by the FAA or NASA, or by other organizations required to accomplish their respective missions, nor does it modify or limit any existing roles or responsibilities.

IV. STATEMENT OF WORK

A. FAA shall:

- Annually review and coordinate planned research

- Provide appropriate opportunities for NASA to participate in FAA program and project planning so that NASA may make strategic decisions associated with research and technology development

- Within budget constraints, provide annual funding for NASA research

- Support the identification, assessment, validation and/or demonstration of candidate concepts and technologies

- Facilitate and support field trials and technology demonstrations, research and testing

- Coordinate the use of FAA researchers and FAA contractor personnel as well as FAA facilities such as the William J. Hughes Technical Center

B. NASA Shall:

- Annually review and coordinate planned research

- Provide appropriate opportunities for FAA to participate in NASA program and project planning so that FAA may make strategic decisions associated with research and technology development and regulatory actions

- Within budget constraints, provide annual funding for FAA research

- Augment FAA capabilities; coordinate and conduct on-site and field research; and, participate in related working groups

- Report research results to the FAA

C. FAA and NASA shall:

- Identify collaborative projects and establish an approach to managing research to be performed under this MOA

- Coordinate to prioritize projects with agreed responsibilities for each activity, including funding, levels of effort, and the application of resources

- Coordinate technology projects with other organizations and universities to enable synergy and avoid duplication

- Share pertinent information

- Transfer technology as appropriate under approved FAA and/or NASA processes

D. Technical Areas of Collaboration:

This MOA provides for the sharing of information and collaboration on research in human error risk analysis in aviation maintenance and flight-line operations; strategies to mitigate crew error; integrating Crew Resource Management usability into operating documents; realistic radio communications simulations; interruptions, distractions, and lapses of attention in the cockpit; team decision-making; air-ground integration; analysis of air traffic control operations; human factors coordination, collaboration, and strategic planning; night vision, vision requirements for aircraft inspection personnel; evaluation of advanced technology applications to aircraft maintenance safety; weather; developing guidelines for the design of instrument procedures and associated charts that enhance the usability by appropriately qualified pilots; and other research consistent with sections II and III above.

E. Funding and Liability:

Under this MOA, and as implemented via documentation mentioned in subsection F below, this collaboration will be on a reimbursable and/or non-reimbursable basis between the FAA and NASA. This MOA will not serve as authorization for the FAA or NASA to commit financial or other resources between FAA and NASA, nor by FAA or NASA to third parties. Any authorization for such expenditures will be stated in the documentation of implementation efforts mentioned in subsection F, and shall be consistent with the applicable authority and operating plans of FAA and NASA. Upon obtaining the appropriate approvals, and necessary funding, FAA and NASA may use their respective statutory and regulatory authority to award contracts, grants, cooperative agreements, and other transactions that support this collaboration.

Resource commitments are subject to availability of those resources and subject to availability of appropriated funds. FAA and NASA agree to assume liability for their own risks associated with the activities pursuant to this MOA and as documented in writing by the agencies.

F. Project/Implementation Plans

This MOA establishes the parameters for collaboration between the FAA and NASA. All implementation efforts pursuant to this MOA, whether reimbursable or non-reimbursable, will be documented in writing and will be signed by appropriate FAA and NASA officials. The form of documentation will be appropriate to the complexity of and resources committed to the effort.

When appropriate, Project/Implementation Plans or Interagency Agreements shall be developed. These plans/agreements shall detail the objectives, scope, elements of performance, resources, responsibilities, authorities, schedule, and products associated with the research to be performed. Each plan/agreement shall be approved prior to performing any work or tasks identified under the plan or agreement. All plans and/or agreements entered into under this MOA shall conform to applicable federal statutes, regulations, orders and directives including agency-specific legislation. If developed, the plans/agreements may be authorized on a case-by-case basis for each task or project.

V. TECHNICAL REPRESENTATIVES

The following positions are responsible to the oversight of this MOA for their respective agencies. They do not have the authority to unilaterally alter the terms of this MOA:

For the FAA:

Program Director,
Human Factors Research and Engineering Division
Headquarters FAA
(Current Incumbent: Dr. Mark Rodgers)

For NASA:

DOT Partnership Manager
Office of Aerospace Technology, NASA Headquarters
(Current Incumbent: Charles Johnson)

The Technical Representatives, or their successors, will resolve all disputes that may arise under this MOA, in accordance with and in compliance with appropriate FAA and NASA policies and procedures.

VI. LIABILITY AND RISK OF LOSS

Each party agrees to assume liability for its own risks associated with agreements and activities undertaken in this MOA.

VII. INTELLECTUAL PROPERTY AND DATA RIGHTS

A. DISSEMINATION OF INFORMATION

To the extent permitted by applicable laws and policies, the initial release of any information to the public, whether oral or written, concerning results or conclusions reached in the performance of this MOA require prior written approval of the Representatives, FAA and NASA, as named in Paragraph 5.

B. PATENT AND INVENTION RIGHTS

The Government shall have government purpose rights to technical data developed as a consequence of, or in direct relation to the performance of activities under this agreement. Custody and administration of inventions made as a consequence of, or in direct relation to, the performance of activities under this agreement will remain with the respective inventing party.

In the event an invention is made jointly by employees of the parties or an employee of a party's contractor, the parties will consult and agree as to future actions toward establishment of patent protection for the invention.

VIII. PERIOD OF PERFORMANCE

The period of performance for this research program shall commence upon the effective date of this agreement and shall remain in effect for five (5) years unless terminated by mutual agreement as outlined in paragraph IX. B.

IX. MODIFICATIONS/AMENDMENTS/TERMINATIONS

A. MODIFICATION

This MOA may be modified only upon the mutual written consent of both agencies. Modifications must be signed by the authorized representatives of the FAA and NASA, or their designees. No oral statement by any person shall be interpreted as modifying or otherwise affecting the terms of this agreement.

B. RIGHT TO TERMINATE

Either agency may terminate this MOA upon 180 days written notice to the other agency, signed by the authorized representative of the terminating agency, or the designee of such representative. The notice shall reference the title and identifying number of this MOA, and shall contain the effective date of the termination. Upon termination, each agency will refund any portion of those funds that have been advanced by the other agency, but not yet expended in connection with work under this MOA.

X. AUTHORITY

A. NASA

This agreement is entered into by NASA pursuant to Section 203(c) of the National Aeronautics and Space Act of 1958, as amended, 42 U.S.C.§ 2473(c).

B. DOT/FAA

This agreement is entered into by FAA pursuant to Sections 226 and 227 of the FAA Reauthorization Act of 1996, 49 U.S.C. §106 (l)(6) and (m).

XI. APPROVALS

Department of Transportation/ Federal Aviation Administration

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Dr. Herman Rediess
Director, Office of Aviation Research

Date: _____

National Aeronautics and Space Administration

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Terrence J. Hertz
Director, Aeronautics Technology Division
Office of Aerospace Technology

Date: _____